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EXAMINER	
ETTEHADIEH, ASLAN	
ART UNIT	**PAPER NUMBER**
2611	

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/018,755	PERTHOLD ET AL.	
	Examiner	Art Unit	
	Aslan Ettehadieh	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 March 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/3/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 3/3/2006 have been fully considered but they are not persuasive.

2. Applicant's arguments of not disclosing a time-dispersive element and further of being silent about effecting a temporal extension of an error signal, such that error signal segments in the frequency spectrum of a transmission signal transmitted by the power amplifier are shifted away from useful frequency range of the transmission signal; Wessel et al. (US 6275685) discloses that the time-dispersive element (figure 4 element 70, figure 6) which is generating a correction signal by a temporal extension of an error signal because due to the frequency changes in the channel, the pre-distorter adaptively adjusts its gain and phase transfer function in response to gain and phase error signals and also a delay line compensates for any delay skew and the output produced is delivered to the amplifier with reduce spectral regrowth (col. 3 lines 4 – 20, col. 5 lines 53 – 60, figure 4 elements 14, 16, 18, 70, figure 6).

3. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Wessel discloses

that in order to compensate for changes in high power amplifier distortions the pre-distorter shifts (adjust is being interpreted as shifts) the phase and gain, examples of distortions mentioned are due to temperature or frequency changes. In order to compensate for the frequency changes mentioned by Wessel, Chen discloses an error cancellation for a power amplifier circuit, where shifting of the frequency range of signals occur (col. 1 lines 13 – 21, col. 2 lines 24 – 25, col. 4 lines 32 – 41).

4. Applicant's arguments of not disclosing a bandpass filter that succeeds the power amplifier; Wessel discloses in figure 4 the power amplifier (element 22) succeeding element 22 are as follows, elements listed in order, 24, 26, 50, 52, 54, 60, 84. Figure 6 shows the input of element 84. Starting from element 84 and succeeding the elements as follows, in order, 84, 720, 722, 724, 726, 727, 728, 713, 712, and finally 714. Therefore, bandpass filter that succeeds the power amplifier.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, 5 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wessel et al. (US 6275685) in view of Leyendecker (US 5867065) in further view of Chen et al. (US 5963091).

2. Regarding claim 1, Wessel discloses a device for predistorting a transmission signal to be transmitted over a nonlinear transmission path (figures 4 – 7), comprising:

an estimator for determining an error signal depending on the transmission signal and a previously registered transfer characteristic of the nonlinear transmission path (col. 7 lines 4 – 11), where the error signal represents an estimate of an error generated due to the nonlinearity of the transmission path (figure 4 element 60, figure 5, col. 7 lines 13 – 64; where the gain and phase error detectors is being interpreted as the estimator);

a time-dispersive element for generating a correction signal by a temporal extension of the error signal (figure 4 element 70, figure 6); and

a combiner (figure 4 elements 16, 18) for combining the transmission signal (figure 4 elements 10) and the correction signal (figure 4 elements 92, 94),

wherein, due to the temporal extension of the error signal, an error signal segment in the frequency spectrum of a transmission signal transmitted by the nonlinear transmission path is shifted away from the useful frequency range of the signal (col. 3 lines 4 – 20, col. 5 lines 53 – 60, figure 4 elements 14, 16, 18, 70, figure 6). Wessel is silent about previously registered transfer characteristic and the frequency spectrum is shifted away from the useful frequency range of the signal.

In the same field of endeavor, however, Leyendecker discloses previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator and where the transfer characteristics depending on one or more past or previous samples is being interpreted as previously registered transfer characteristic).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by

Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

Also, in the same field of endeavor, however, Chen discloses the frequency spectrum is shifted away from the useful frequency range of the signal (col. 1 lines 13 – 21, col. 2 lines 24 – 25, col. 4 lines 32 – 41).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use the frequency spectrum is shifted away from the useful frequency range of the signal as taught by Chen in the system of Wessel to more efficient modulation providing for better transmission after amplification.

3. Regarding claim 2, Wessel further discloses the nonlinear transmission path is a power amplifier (figure 4 element 22).

4. Regarding claim 5, Wessel further discloses the estimator has an envelope detector for detecting the envelope of the transmission signal (figure 4 element 34), a quantizer for forming quantized envelope values and a table unit for supplying complex distortion coefficients which depend on the quantized envelope values (col 4 lines 38 – 54) and on the previously registered transfer characteristic of the nonlinear transmission path. Wessel is silent about the previously registered transfer characteristic

In the same field of endeavor, however, Leyendecker discloses previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

5. Regarding claim 6, Wessel further discloses the estimator also includes a unit for combining the squares of the magnitudes or of the envelope values and the complex coefficients for generating the error signal (col. 7 lines 13 – 64).

6. Regarding claim 7, Wessel further discloses the time-dispersive element is a time-dispersive bandpass filter or low-pass filter (figure 6 element 714, col. 8 lines 27 – 28).

7. Regarding claim 8, Wessel further discloses an adapter (figure 4 element 70) is provided which, on the basis of a signal to be transmitted and an output signal output by a nonlinear transmission path if there is no predistortion (col. 6 lines 34 – 62, col. 10 lines 58 – 62), ascertains the transfer characteristic of the nonlinear transmission path and uses this to control the estimator and/or the filter coefficients of the time-dispersive bandpass filter or low-pass filter (col. 6 lines 34 – 49, and col. 12 lines 19 – 35).

8. Regarding claim 9, Wessel further discloses the adapter ascertains the transfer characteristic at predetermined times (col. 10 lines 25 –63; where k in i.sub.k (col. 10 line 38) is selected yield a predetermined time for the convergence of the adaptive unit found in figure 4 element 70).

9. Regarding claim 10, Wessel further discloses a high-frequency (col. 6 line 9; where a radio frequency band is being interpreted as a high frequency) transmitter

comprising: a predistorter for predistorting a transmission signal to be transmitled over a nonlinear transmission path (figures 4 – 7), said predistorter comprising: an estimator for determining an error signal depending on the transmission signal and a previously registered transfer characteristic of the nonlinear transmission path (col. 7 lines 4 – 11), where the error signal represents an estimate of an error generated due to the nonlinearity of the transmission path (figure 4 element 60, figure 5, col. 7 lines 13 – 64; where the gain and phase error detectors is being interpreted as the estimator); a time-dispersive element for generating a correction signal by a temporal extension of the error signal (figure 4 element 70, figure 6); and a combiner (figure 4 elements 16, 18) for combining the transmission signal (figure 4 elements 10) and the correction signal (figure 4 elements 92, 94), wherein, due to the temporal extension of the error signal, an error signal segment in the frequency spectrum of a transmission signal transmitted by the nonlinear transmission path is shifted away from the useful frequency range of the signal (col. 3 lines 4 – 20, col. 5 lines 53 – 60, figure 4 elements 14, 16, 18, 70, figure 6);

a power amplifier for amplifying a transmission signal which has been predistorted by the predistorter (figure 4 element 22); and a bandpass filter which succeeds the power amplifier (figure 6 element 714, col. 8 lines 27 – 28) and whose transmission band is adjusted to the useful frequency range of the transmission signal (col. 5, lines 53 – 60).

Wessel is silent about previously registered transfer characteristic and the frequency spectrum is shifted away from the useful frequency range of the signal.

In the same field of endeavor, however, Leyendecker discloses previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

Also, in the same field of endeavor, however, Chen discloses the frequency spectrum is shifted away from the useful frequency range of the signal (col. 1 lines 13 – 21, col. 2 lines 24 – 25, col. 4 lines 32 – 41).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use the frequency spectrum is shifted away from the useful frequency range of the signal as taught by Chen in the system of Wessel to more efficient modulation providing for better transmission after amplification.

10. Regarding claim 11, the steps claimed as method is nothing more than restating the function of the specific components of the apparatus as claim 1 above and therefore, it would have been obvious, considering the aforementioned rejection for the apparatus claim 1.

11. Regarding claim 12, Wessel discloses a method for spectrally forming an interference spectrum of a transmission signal at the output of a power transmitter (col. 3 lines 11 –20), said method comprising the steps of: generating an error signal from

the transmission signal (figure 4 elements 82, 84) and a previously registered transfer characteristic of a power amplifier, wherein the error signal represents an estimate of an error generated due to a nonlinearity of the power amplifier (figure 4 element 60, figure 5, col. 7 lines 13 – 64; where the gain and phase error detectors is being interpreted as the estimator); effecting a temporal extension of the error signal to generate a correction signal; combining the correction signal and the transmission signal to generate a predistorted transmission signal(figure 4 elements 10, 16, 18, 92, 94), wherein , due to the temporal extension of the error signal, an error signal segment in the frequency spectrum of a transmission signal transmitted by the power amplifier is shifted away from the useful frequency range of the transmission signal (col. 3 lines 4 – 20, col. 5 lines 53 – 60, figure 4 elements 14, 16, 18, 70, figure 6); and feeding the predistorted transmission signal (S1') into the power amplifier. Wessel is silent about a previously registered transfer characteristic (figure 4 element 22).

In the same field of endeavor, however, Leyendecker discloses a previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

12. Regarding claim 13, Wessel further discloses the step of performing bandpass filtering of an output signal output by the power amplifier (figure 4, elements 22, 24, 26, 50, 52, 54, 60, 82, 84, 70; figure 6 elements 82, 84, 714, 744; col. 8 lines 27 – 28)

13. Claims 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wessel et al. (US 6275685) in view of Leyendecker (US 5867065) in further view of Chen et al. (US 5963091) in further view of Cavers (US 5049832).

14. Regarding claim 3, Wessel discloses the estimator has a unit for forming the squares of the magnitudes of the transmission signal to be transmitted and a table for supplying complex distortion coefficients (col. 10 lines 25 – 67), which depend on the squares of the magnitudes and on the previously registered transfer characteristic of the nonlinear transmission path (col. 7 lines 4 – 11). Wessel does not disclose a unit for forming the squares of the magnitudes and a table depend on the squares of the magnitudes (Leyendecker does mention a least squares method which is a sum of the squares: col. 14 lines 24 – 25).

In the same field of endeavor, however, Cavers discloses a unit for forming the squares of the magnitudes and a table depend on the squares of the magnitudes (figure 5, col. 7 line 58 – col. 8 line 15).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use a unit for forming the squares of the magnitudes and a table depend on the squares of the magnitudes as taught by Cavers in the system of Wessel to provide an estimate of the power of the noise in the signal.

15. Regarding claim 4, Wessel discloses the unit for forming the squares of the magnitudes of the real (col. 10 lines 25 – 33) and the imaginary part of the transmission signal is provided. Wessel is silent about the imaginary part of the transmission signal is provided.

In the same field of endeavor, however, Cavers discloses the imaginary part of the transmission signal is provided (col. 3 lines 30 – 37).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use the imaginary part of the transmission signal is provided as taught by Cavers in the system of Wessel to allow for modulation of the signal for efficient transmission.

16. Claims 14 – 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wessel et al. (US 6275685) in view of Leyendecker (US 5867065) in view of Chen et al. (US 5963091) in view of Chow et al. (US 6614854).

17. Regarding claim 14, Wessel does not disclose coefficients of the time-dispersive element are determined in advance from the transfer characteristic of the nonlinear transmission path.

In the same field of endeavor, however, Chow discloses coefficients of the time-dispersive element are determined in advance from the transfer characteristic of the nonlinear transmission path (col. 3 line 62 – col. 4 line 8; where the filter is being interpreted as Wessel's time-dispersive element and where stored in memory is being interpreted as determined in advance).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use coefficients of the time-dispersive element are determined in advance from the transfer characteristic of the nonlinear transmission path as taught by Chow in the system of Wessel to amplifier compensation thus providing more accuracy.

18. Regarding claim 15, Wessel discloses all limitations of claim 15 as analyzed in claim 14 above.

19. Regarding claims 16 and 17, the steps claimed as method is nothing more than restating the function of the specific components of the apparatus as claim 14 above and therefore, it would have been obvious, considering the aforementioned rejection for the apparatus claim 14.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a) necessitated by the applicant's amended claims.

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aslan Ettehadieh whose telephone number is (571) 272-8729. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Aslan Ettehadieh
Examiner
Art Unit 2637

AE

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER